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Report on the individual review of the annual submission of Ireland submitted in 2014*

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2014 annual submission of Ireland, coordinated by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 8 to 13 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Elena Gavrilova (former Yugoslav Republic of Macedonia) and Ms. Batima Punsalmaa (Mongolia); energy – Ms. Lea Kai Aboujaoudé (Lebanon), Ms. Rana Humbatova (Azerbaijan), Ms. Lungile Manzini (South Africa) and Mr. Ioannis Sempos (Greece); industrial processes and solvent and other product use – Ms. Valentina Idrisova (Kazakhstan) and Mr. Mauro Meirelles de Oliveira Santos (Brazil); agriculture – Ms. Yauheniya Bertosh (Belarus) and Mr. Sorin Deaconu (Romania); land use, land-use change and forestry (LULUCF) – Mr. Sandro Federici (San Marino), Mr. Markus Haakana (Finland) and Ms. Takako Ono (Japan); and waste – Mr. Pavel Gavrilita (Republic of Moldova) and Ms. Detelina Petrova (Bulgaria). Ms. Batima and Mr. Sempos were the lead reviewers. The review was coordinated by Mr. Tomoyuki Aizawa (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Ireland, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified. The expert review team (ERT) notes that the 2013 annual review report of Ireland was published after 15 April 2014, which may have affected the Party's ability to implement recommendations and encouragements made in the previous review report.

3. All recommendations and encouragements included in this report are based on the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" adopted through decision 24/CP.19. Therefore, when preparing the next annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by Ireland was carbon dioxide (CO_2), accounting for 64.9 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by methane (CH_4) (20.6 per cent) and nitrous oxide (N_2O) (12.7 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.8 per cent of the overall GHG emissions in the country. The energy sector accounted for 63.3 per cent of total GHG emissions, followed by the agriculture sector (30.7 per cent), the industrial processes sector (4.1 per cent), the waste sector (1.7 per cent) and the solvent and other product use sector (0.1 per cent). Total GHG emissions amounted to 58,531.24 Gg CO_2 eq and increased by 5.6 per cent between the base year[2] and 2012. The ERT concluded that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable, with the

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

exception of the key drivers of emission/removal trends for cropland, grassland, wetlands, settlements and other land, which are not included in Ireland's NIR. The ERT recommends that the Party include this information in the next NIR.

5. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.

6. Information to be included in the compilation and accounting database can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year[a] to 2012

			Gg CO_2 eq								*Change (%)*
		Greenhouse gas	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year 2012*
Annex A sources[b]		CO_2	32 423.99	32 423.99	35 232.54	47 005.72	41 749.65	41 292.13	37 716.34	38 011.39	17.2
		CH_4	13 674.09	13 674.09	13 919.99	12 237.97	11 947.66	11 720.62	11 692.05	12 074.01	−11.7
		N_2O	9 112.12	9 112.12	9 555.24	7 640.05	7 551.09	7 837.02	7 288.43	7 416.59	−18.6
		HFCs	37.13	0.47	37.13	973.06	957.12	973.37	992.28	982.01	2 545.1
		PFCs	75.38	0.09	75.38	106.20	65.57	37.02	13.20	8.03	−89.3
		SF_6	82.93	35.51	82.93	57.50	41.17	34.74	47.66	39.21	−52.7
KP-LULUCF	Article 3.3[c]	CO_2				−2 714.68	−3 048.61	−3 454.85	−3 460.81	−3 622.88	
		CH_4				1.37	0.79	5.24	1.93	0.49	
		N_2O				0.12	0.07	0.45	0.17	0.04	
	Article 3.4[d]	CO_2	NA			NA	NA	NA	NA	NA	NA
		CH_4	NA			NA	NA	NA	NA	NA	NA
		N_2O	NA			NA	NA	NA	NA	NA	NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol, only the inventory years of the commitment period must be reported.

[b] CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include the emissions from deforestation that were included in Ireland's initial report under the Kyoto Protocol for the base year and subsequently used for the calculation of the assigned amount.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2012

		Gg CO_2 eq								*Change (%)*
	Sector	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*
Annex A sources	Energy	30 970.48	30 970.48	33 779.89	45 240.08	40 761.57	40 482.32	37 008.94	37 062.65	19.7
	Industrial processes	3 337.80	3 178.43	3 065.51	3 438.34	2 549.19	2 344.17	2 220.41	2 421.22	–27.5
	Solvent and other product use	80.03	80.03	85.39	73.94	71.37	71.16	72.07	72.72	–9.1
	Agriculture	19 634.06	19 634.06	20 314.39	18 150.58	17 937.38	18 004.52	17 380.55	17 967.39	–8.5
	Waste	1 383.27	1 383.27	1 658.03	1 117.56	992.75	992.73	1 067.99	1 007.26	–27.2
	LULUCF	NA	–2 312.58	–1 373.89	–4 131.75	–4 495.78	–3 857.78	–3 638.60	–3 144.85	NA
	Total (with LULUCF)	**NA**	**52 933.69**	**57 529.32**	**63 888.74**	**57 816.48**	**58 037.12**	**54 111.36**	**55 386.39**	**NA**
	Total (without LULUCF)	**55 405.63**	**55 246.27**	**58 903.21**	**68 020.49**	**62 312.26**	**61 894.90**	**57 749.96**	**58 531.24**	**5.6**
	Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c] Afforestation and reforestation				–3 174.25	–3 429.63	–3 659.22	–3 791.41	–3 846.80	
	Article 3.3[c] Deforestation				461.06	381.87	210.07	332.70	224.45	
	Total (3.3)				**–2 713.19**	**–3 047.76**	**–3 449.16**	**–3 458.71**	**–3 622.35**	
	Article 3.4[d] Forest management				NA	NA	NA	NA	NA	
	Article 3.4[d] Cropland management	NA			NA	NA	NA	NA	NA	NA
	Article 3.4[d] Grazing land management	NA			NA	NA	NA	NA	NA	NA
	Article 3.4[d] Revegetation	NA			NA	NA	NA	NA	NA	NA
	Total (3.4)	**NA**			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 15 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR. Ireland further submitted revised CRF tables on 15 May 2014. Ireland also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. The list of other materials used during the review is provided in annex II to this report.

2. Questions of implementation raised in the 2013 annual review report

9. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

10. Table 3 contains the ERT's overall assessment of the annual submission of Ireland. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on completeness		
Annex A sources[a]	Complete	Mandatory: none
		Non-mandatory: "NE" is reported for N_2O emissions from other under solvent and other product use (use of N_2O for anaesthesia and N_2O emissions from aerosol cans) (see para. 37 below)
Land use, land-use change and forestry[a]	Complete	Mandatory: none
		Non-mandatory: "NE" is reported for the carbon stock changes in settlements remaining settlements and CH_4 emissions from drainage of soils and wetlands (for forest land and wetlands)
KP-LULUCF	Complete	

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on recalculations and time-series consistency		
Transparency of recalculations	Sufficiently transparent	Recalculations are sufficiently documented in the NIR and the CRF tables
Time-series consistency	Sufficiently consistent	
The ERT's findings on QA/QC procedures	Generally sufficient	The Party has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan. The ERT has identified some cases where the use of notation keys should be improved. The ERT has also identified some inconsistencies of the information reported in different parts of the NIR, or in the NIR compared with the CRF tables. Sector-specific QA activities have not been documented for all sectors (e.g. waste) Please see paragraphs 30, 32, 33, 41, 59, 60, 66 and 68 below for category-specific recommendations
The ERT's findings on transparency	Not sufficiently transparent	The descriptions in the NIR of (a) use of EU ETS data in the energy sector; and (b) the assumptions and methodologies used for estimating emissions need to be improved. The LULUCF chapter of the NIR does not fully follow the annotated outline of an NIR, which makes it challenging to find information Please see paragraphs 26, 27, 30, 31, 33, 57, 58, 60, 61, 71, 72, 73, 79, 80, and 81 below for category-specific recommendations

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, EU ETS = European Union Emissions Trading System, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NE = not estimated, NIR = national inventory report, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

11. There were no changes to the inventory management process carried out by the Party for the 2014 annual submission, as indicated by the Party in its NIR and additional information provided by the Party during the review. The description of the inventory

planning process, as contained in the report of the individual review of the annual submission of Ireland submitted in 2013,[3] remains relevant.

12. The establishment of Ireland's national inventory system was completed by Government Decision in early 2007, building on the framework that had been applied for many years. The Office of Climate, Licensing, Resource and Research (OCLR) of the Environmental Protection Agency (EPA) was designated as the inventory agency and the EPA was also designated as the single national entity with overall responsibility for the annual GHG inventory. Within OCLR, the Climate Resource and Research Programme (CRRP) compiles the national GHG emission inventories for submission on behalf of Department of the Environment, Community and Local Government (DECLG) to the UNFCCC secretariat pursuant to decision 280/2004/EC, which is the basis for European Union (EU) member States' reporting under the Convention and the Kyoto Protocol. All formal mechanisms, together with the quality assurance/quality control (QA/QC) procedures, have been fully operational since they were established in the 2007 reporting cycle.

Inventory preparation

13. Table 4 contains the ERT's assessment of Ireland's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
Assessment of inventory preparation by Ireland

Issue	*ERT assessment*	*ERT findings and recommendations*
Key category analysis		
Was the key category analysis performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Level and trend analysis performed, including and excluding LULUCF
Approach followed?	Tier 1	Initial work on the tier 2 key category analysis was carried out, but due to resource constraints the Party was not able to prepare a tier 2 key category analysis. However, it is planned for the 2015 submission
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC	Yes	Ireland identified afforestation as a key category for activities under Article 3, paragraph 3, of the Kyoto Protocol The ERT reiterates the recommendation made in the previous review report that the Party include a paragraph explaining the assessment of key categories for the KP-LULUCF activities in chapter 11 of its NIR in order to

[3] FCCC/ARR/2013/IRL, paragraphs 11, 12 and 13.

Issue	*ERT assessment*	*ERT findings and recommendations*
inventory?		enhance the transparency of its NIR
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
Assessment of uncertainty analysis		
Approach followed?	Tier 1	
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	
Quantitative uncertainty (including LULUCF)	Level = 11.3% Trend = 6.2%	
Quantitative uncertainty (excluding LULUCF)	Level = 6.8% Trend = 2.7%	

Abbreviations: ERT = expert review team, IPCC good practice guidance = Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

Inventory management

14. There were no changes to the inventory management process carried out by the Party for the 2014 annual submission, as indicated by the Party in response to questions raised by the ERT during the review. The description of the inventory management process, as contained in the report of the individual review of the annual submission of Ireland submitted in 2013,[4] remains relevant.

5. Follow-up to previous reviews

15. Recommendations from previous reviews that have not yet been implemented, as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 9 below.

B. Energy

1. Sector overview

16. The energy sector is the main sector in the GHG inventory of Ireland. In 2012, emissions from the energy sector amounted to 37,062.65 Gg CO_2 eq, or 63.3 per cent of total GHG emissions. Since 1990, emissions have increased by 19.7 per cent. Emissions increased by 47.2 per cent from 1990 to 2005 and then decreased by 18.7 per cent between

[4] FCCC/ARR/2013/IRL, paragraphs 15 and 16.

2005 and 2012. The sectors driving the trend in Ireland are energy industries and transport. The key drivers for the fall in emissions since 2005 are: (a) a reduction in the use of Moneypoint coal-fired power stations because of the implementation of pollutant control measures in 2006; (b) the replacement of oil by natural gas in 2007; and (c) the impact of the economic recession in 2008. Within the sector, 34.5 per cent of the emissions were from energy industries, followed by 29.4 per cent from transport, 24.5 per cent from other sectors and 11.5 per cent from manufacturing industries and construction. The remaining 0.1 per cent were from fugitive emissions from oil and natural gas.

17. Ireland has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations were in the following categories: manufacturing industries and construction and other sectors. The recalculations were made following changes in activity data (AD), namely, changes related to the quantities of natural gas, fuel oil, petroleum coke, bituminous coal, biomass and charcoal quantities in the energy balance. The AD for peat for the category manufacturing industries and construction – food processing, beverages and tobacco (CRF category 1.A.2.e) were included for the first time (for 2005 onwards) and changes in CO_2 emission factors (EFs) for natural gas were also introduced. In addition, the use of the new version 10.0 of the COPERT IV model gave rise to significant recalculations due to improvements in the methodology and in the CH_4 EFs for gasoline (for all years in the period 1990–2011, except 1994), diesel oil (for the years 1990–2010) and liquefied petroleum gas (LPG) (for the years 1990, 1993, 2002 and 2009) and the N_2O EFs for gasoline (for all years in the period 1990–2011), diesel oil (for the years 1990–2009) and LPG (for 2002, 2009 and 2011). However, because emissions of CH_4 and N_2O are smaller than emissions of CO_2 in this sector, the impact on the total emissions for the road transportation sector is small. Compared with the 2013 annual submission, the recalculations increased emissions in the energy sector in 2011 by 70.06 Gg CO_2 eq (0.2 per cent). The recalculations were adequately explained in CRF table 8(b), in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance).

18. In response to recommendations made in the 2013 annual review report, Ireland has performed significant improvements by providing the following information: (a) a full description of the stakeholders and the process used to compile the energy balance, including a breakdown of energy consumption by end-user; (b) details of the CO_2 EFs and net calorific values (NCVs) for all fossil fuels; (c) details of the calculation of country-specific EFs; (d) a detailed description of the COPERT IV model, version 10.0, which was used in the calculations for the transport sector; (e) a description of the category-specific QA/QC procedures used in the inventory; and (f) a correction of the discrepancies between the NIR and the CRF tables. The ERT commends Ireland for these improvements.

19. The ERT notes that there are some differences between the data reported in the CRF tables and the data reported to the International Energy Agency (IEA) for fuel combustion. For example, the total apparent consumption reported to the UNFCCC for Ireland corresponds to that reported to IEA within 2 per cent for all years, except 1990, 2005–2006, 2008 and 2012 (4–8 per cent). In response to a question raised by the ERT during the review, Ireland explained that the difference between the two data sets is attributed to methodological differences as well as the use of different NCVs in the CRF tables compared with the IEA data. The ERT noted that Ireland is working on synchronizing the IEA data with the energy balance oil data to resolve these differences. The ERT commends Ireland for developing these data harmonization procedures and encourages Ireland to report on the progress made.

2. Reference and sectoral approaches

20. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 21–25 below.

Table 5
Review of reference and sectoral approaches

Issue	*Expert review team assessment*	*Paragraph cross references*
Difference between the reference approach and the sectoral approach	Energy consumption: **12.48 PJ, 2.48%** CO_2 emissions: **856.11 Gg CO_2, 2.35%**	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	No	See paragraphs 21 and 22 below
Are differences with international statistics adequately explained?	Yes	See paragraphs 19 above and 24 below
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	See paragraph 23 below
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	See paragraph 25 below

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

21. CO_2 emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For 2012, there is a difference of 2.35 per cent in the CO_2 emission estimates between the reference approach and the sectoral approach. The difference is attributed to statistical differences between supply and demand. Explanations for the fluctuations in the differences between the two approaches across the years are not clearly provided in the NIR and in CRF table 1.A(c). The ERT encourages Ireland to provide explanations for the differences in the NIR as well as in the documentation box of CRF table 1.A(c) in its subsequent submission.

22. The ERT noted that there is a significant discrepancy in CO_2 emissions between the sectoral and reference approaches, regarding liquid fuels (–5.2 per cent) for 2012, in comparison with the data for 1990–2011 (ranging from –4.2 to 2.7 per cent). The road transportation category is the largest consumer of liquid fuels in the energy sector in Ireland. During the review, in response to a question raised by the ERT, Ireland provided the ERT with the comparison of the emissions from liquid fuels at a disaggregated level for all years between 1990 and 2012 and the detailed energy balance for 2012. Ireland attributed the difference in CO_2 emissions from liquid fuels between the sectoral and reference approaches to the statistical difference between the total primary energy requirement and total final consumption. The ERT recommends that the Party further investigate the difference between the two approaches and report accordingly in the next NIR.

International bunker fuels

23. GHG emissions from fuel combustion from both international aviation and marine bunkers have been reported by Ireland. Following a recommendation made in the previous review report, emissions of CH_4 and N_2O have been estimated for all years for international bunker fuels for the first time. The ERT commends Ireland for this improvement.

24. The ERT noted that the data reported for consumption of international aviation (2006 and 2009) and international marine bunkers (2008–2012) are different from the data reported to IEA. In addition, consumption of jet kerosene is about 2–7 per cent higher in the CRF tables for most of the years because of higher NCVs, and the residual fuel oil quantities reported in the CRF tables are systematically larger by 3–4 per cent until 2008, 18 per cent smaller in 2009 and about 20 times larger in 2010. For gas/diesel oil, the quantities in the CRF tables show a large difference for 2008–2012 (up to 40 per cent). In response to a question raised by the ERT during the review, Ireland explained that this issue must be further investigated as part of the process of aligning the IEA data and the national energy balance data. The ERT encourages Ireland to make efforts to harmonize the national data and international data and to report on the progress made in the NIR.

Feedstocks and non-energy use of fuels

25. The ERT noted that Ireland did not include in its national total any CO_2 emissions associated with the emissive part of the non-energy use of lubricants. During the review, in response to a question raised by the ERT, Ireland explained that lubricants used in road transportation are collected and recycled in Ireland or exported. No lubricant oils are used for combustion or incinerated in Ireland, since the Party does not have any hazardous waste incinerators suitable for burning lubricant waste oils. Although a portion of lubricants used in road vehicles results in CO_2 emissions, Ireland does not currently estimate these emissions claiming that no methodology exists in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) or the IPCC good practice guidance. The Party also stated that its inventory agency is considering estimating these emissions for the next submission using EFs from a road transportation model (i.e. COPERT IV). The ERT welcomes the provided information on fate of lubricants after usage in road transportation and strongly recommends that Ireland investigate the emissions related to the non-energy use of lubricants, other than road transportation, and report accordingly in the next submission. In the comments to the draft review report, Ireland informed the ERT that these emissions from lubricants have been estimated in Ireland's draft 2013 inventory in accordance with the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines).

3. Key categories

Stationary combustion: liquid and gaseous fuels – CO_2

26. Ireland does not describe transparently in its NIR the plant-specific data used to calculate CO_2 emissions from manufacturing industries and construction. In response to a question raised by the ERT during the review, Ireland explained that the calculation of CO_2 emissions is based on the data available from the European Union Emissions Trading System (EU ETS). Moreover, these data are used by the energy balance provider in order to improve the statistical differences between the supply and demand data of the energy balance. The ERT reiterates the recommendation made in the previous review report that Ireland improve the transparency of the reporting of emission estimates for this category by providing more information in relation to the use of EU ETS data in the NIR.

27. The ERT noted that Ireland did not include in the NIR the AD and CO_2 EFs for the different types of fuel and industrial activities reported under other (manufacturing

industries and construction). In response to a question raised by the ERT during the review regarding the disaggregation of data, Ireland explained that according to the CRF tables there is no requirement to disaggregate this category by industry. However, as this subcategory is the biggest source of CO_2 emissions from manufacturing industries and construction (around 39 per cent in 2012), the ERT recommends that Ireland provide this information, in order to increase the transparency of the reporting of this category.

28. The ERT noted that the CO_2 implied emission factor (IEF) for gaseous fuels in petroleum refining for 2012 (83.21 t/TJ) is the highest compared with other reporting Parties (53.81–58.66 t/TJ). In response to a question raised by the ERT during the review, the Party explained that the amount of liquid fuels is overstated, as some natural gas is reported with refinery gas. The ERT recommends that Ireland further investigate this issue and report accordingly in the next NIR.

4. Non-key categories

Civil aviation: liquid fuels – CO_2

29. The ERT noted that, during the previous stage of the review, it was identified that the energy consumption for domestic aviation was generally 20–60 per cent lower in the CRF tables than in the data reported to IEA, while the values in the CRF tables for domestic navigation were up to three times higher than those reported to IEA from 2000 onwards, due to a sharp drop in the IEA data for gas/diesel oil consumption after 1999. In response to a question raised by the ERT during the review, Ireland stated that this issue must be further investigated as part of its work on aligning the IEA data and the national energy balance data. The ERT encourages Ireland to make efforts to harmonize the national data and international data and to report on the progress made.

Other transportation: liquid fuels – CO_2

30. The ERT noted that Ireland did not report transparently in the NIR on the fuels used for other non-road vehicles (e.g. motorized equipment in the construction and building industries, lawn mowers in the residential sector, ground activities at airports and harbours). In response to a question raised by the ERT during the review, Ireland explained that since the energy balance does not provide a split on fuel used for mobile equipment in industry, commercial or residential, mobile emissions are reported together with stationary emissions. However, the ERT noted that Ireland used the notation key "NO" (not occurring) to report liquid fuels in the subcategory other transportation, instead of "IE" (included elsewhere). The ERT therefore reiterates the recommendation made in the previous review report that Ireland review the notation key used to report liquid fuels and, as appropriate, change the notation key from "NO" to "IE", and provide a transparent description of the basis for dividing fuel consumption between road and non-road traffic.

Oil and natural gas: gaseous fuels – CO_2 and CH_4

31. The ERT noted that Ireland did not report transparently where fugitive emissions of CH_4 and CO_2 from natural gas exploration and transmission are reported, as it used the notation key "IE" without providing further explanation. In response to a question raised by the ERT during the review, Ireland explained that these emissions were reported together under distribution. The ERT recommends that Ireland provide this explanation both in the CRF tables and in the NIR, and provide a detailed description of how the emissions from each activity are estimated in the NIR.

32. The ERT noted that Ireland uses different notation keys in NIR table 3.1 and the CRF tables. For example, fugitive CO_2 emissions from natural gas and fugitive CH_4 emissions from venting and flaring are reported as "NO" in NIR table 3.1, while these emissions are reported as "IE" in CRF table 1.B.2. The ERT recommends that Ireland

explain where these emissions are allocated in the CRF tables and recommends that Ireland use notation keys consistently between the NIR and the CRF tables.

33. Ireland reported fugitive emissions from other leakages from natural gas as "NO", while table 1.58 of the Revised 1996 IPCC Guidelines provides EFs for this category. In response to a question raised by the ERT during the review, Ireland explained that these emissions were reported together under distribution. The notation key should consequently be changed to "IE". The ERT recommends that Ireland use the appropriate notation keys and provide a detailed description of how the emissions from each activity are estimated in the NIR.

34. Ireland reports the CH_4 fugitive emissions from flaring as "NO" for the whole time series, although it is stated in the NIR that "a small amount of flaring" is reported by the Department of Communications, Energy and Natural Resources for some years. In response to a question raised by the ERT during the review, Ireland explained that fugitive CH_4 emissions from flaring in natural gas production are reported only for 1999 when a third mobile drilling unit (Glomar Arctic 3) was operating in the Kinsale field and in 2001 when a drilling vessel (Noble Ton van Langevald) was operating offshore at Kinsale. For other years of the time series, Ireland reported these fugitive emissions as "NO". The ERT welcomes this explanation and recommends that Ireland include this information in the next NIR.

C. Industrial processes and solvent and other product use

1. Sector overview

35. In 2012, emissions from the industrial processes sector amounted to 2,421.22 Gg CO_2 eq, or 4.1 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 72.72 Gg CO_2 eq, or 0.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 23.8 per cent in the industrial processes sector, and decreased by 9.1 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the closure of ammonia (NH_3) and nitric acid plants between 2002 and 2003. Within the industrial processes sector, 57.5 per cent of the emissions were from mineral products, followed by 42.5 per cent from consumption of halocarbons and SF_6.

36. Ireland has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. The most significant recalculation made by Ireland between the 2013 and 2014 annual submissions was in the category consumption of HFCs and SF_6. The recalculation was made following changes in AD and a revised methodological approach. Compared with the 2013 annual submission, the recalculation increased emissions in the industrial processes sector by 453.04 Gg CO_2 eq (25.6 per cent) in 2011, and increased total national emissions by 0.8 per cent. The recalculation was adequately explained in the NIR (section 4.7 and tables 4.4 and 4.5).

37. Ireland reported "NE" (not estimated) for N_2O emissions from anaesthesia and aerosol cans in the solvents and other product use sector as there is no methodology in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, though the ERT notes that thirty nine Parties report these emissions. The ERT encourages Ireland to investigate the possibility of reporting N_2O emissions from these categories. Also, the NIR states that Ireland has funded a study on updating the emission estimates for the solvents and other product use sector, the results of which are to be included in the next submission. The ERT commends Ireland for its efforts regarding the continuous improvement of the inventory.

38. In response to the previous review report, Ireland has reported additional information on the EFs and clarifications of the EU ETS methodology and data/verified CO_2 emissions used for mineral production. The ERT commends Ireland for improving the transparency of the NIR.

2. Key categories

Consumption of halocarbons and SF_6 – HFCs and SF_6

39. Ireland recalculated estimates of fluorinated gases (F-gases) for the whole time series in the 2014 annual submission based on the results of a study completed in 2013 which provided updated information collected directly from the stakeholders using the best practice, as outlined in the IPCC good practice guidance. The recalculations were mainly due to the inclusion of new AD and data on new refrigerants from new and existing sources and the revision of the methodological approach in the 2014 annual submission. All improvements and recalculations are explained in the corresponding chapters of the NIR. The Party carried out the QA/QC procedures to ensure the consistency of the estimates based on the recent studies with the IPCC good practice guidance, including a comparison of the emissions with other European countries and a full check of the category by the independent international expert. The ERT commends Ireland for its efforts to improve the quality of the estimates of F-gases.

40. The ERT noted that HFCs from foam blowing were reported as "NO" in the CRF tables with an explanation in the NIR which states that it was due to there being no open-cell foam production in Ireland; and the production of closed-cell foam takes place in Ireland by one company that used HCFC-141b and now uses pentane. The ERT recommends that Ireland provide, in its next submission, additional information on how other potential sources (e.g. from imported products) are considered in the emission estimates from this category to ensure a complete and accurate inventory.

3. Non-key categories

Limestone and dolomite use – CO_2

41. The NIR (page 91, para. 4.2.3, "Limestone and dolomite use") reports that the stoichiometric ratio of CO_2 to calcium carbonate ($CaCO_3$) was used as an EF (0.44 t CO_2/t limestone) for the CO_2 emission estimates for both the EU ETS and non-ETS calculations. However, CRF table 2(I).A–G and NIR table F.3 report the IEF for limestone and dolomite use as fluctuating from 0.436 (2001) to 0.432 (2014). The previous review report[5] recommended that the Party provide more explanation for the fluctuation. The 2014 NIR provides actual AD, EFs and explanations for the various sources of limestone use and their contribution to the AD and emission trends in different years. In response to a question raised by the ERT during the review, Ireland explained that, due to the late publication of the previous annual review report, the text of the NIR was not revised properly and that it would be revised in future submissions. The ERT recommends that Ireland ensure consistency within the NIR and between the NIR and the CRF tables in future submissions.

D. Agriculture

1. Sector overview

42. In 2012, emissions from the agriculture sector amounted to 17,967.39 Gg CO_2 eq, or 30.7 per cent of total GHG emissions. Since 1990, emissions have decreased by 8.5 per

[5] FCCC/ARR/2013/IRL, paragraph 55.

cent. The key drivers for the fall in emissions are the decrease in the numbers of dairy cattle and sheep, and the decrease in the amount of synthetic nitrogen (N) fertilizer applied to agricultural soils. Within the sector, 49.0 per cent of the emissions were from enteric fermentation, followed by 35.9 per cent from agricultural soils and 15.0 per cent from manure management.

43. Ireland has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by Ireland between the 2013 and 2014 annual submissions was in the following category: agricultural soils. The recalculation was made following changes in AD. Compared with the 2013 annual submission, the recalculation decreased emissions in the agriculture sector by 312.65 Gg CO_2 eq (1.8 per cent) and decreased total national emissions by 0.5 per cent. The recalculation was adequately explained.

44. The inventory is complete with respect to the coverage of activities, gases and years, is transparent and accurate, the emissions being estimated in line with the provisions in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. Uncertainties, recalculations, QA/QC procedures and sector-specific improvements have been described in the NIR at the sectoral level. The estimates are consistent across the time series; the sources of AD and EFs, the methodological issues and the AD, EFs and emission trends have been generally clearly explained in the NIR.

45. During the previous review, the ERT recommended that the Party improve the description of the methods used for the estimation of emissions, especially in relation to the reports by O'Mara (2006)[6] and Hyde et al. (2008).[7] The ERT commends Ireland for the implementation of the recommendation through the provision of references to published information and of additional information as part of the NIR.

2. Key categories

Enteric fermentation – CH_4

46. Ireland uses both tier 1 and tier 2 methods provided by the IPCC good practice guidance to estimate the emissions: a tier 2 method with country-specific EFs is used to estimate emissions from dairy cattle and non-dairy cattle, while a tier 1 method with default EFs is used to estimate emissions from the remaining livestock types. The AD are provided by the Central Statistics Office of Ireland (CSO). The approach implemented is in line with the IPCC good practice guidance.

47. Ireland used the tier 1 method to estimate CH_4 emissions from sheep, although it had been recommended that the Party use the tier 2 method to estimate these emissions in several previous review reports, considering that CH_4 emissions from enteric fermentation has been identified as a key category. The ERT considered that the use of the tier 1 method is still in line with the IPCC good practice guidance, taking into account the significance of emissions from sheep in this subcategory (accounting for 10.8 per cent and 6.9 per cent of the total emissions from enteric fermentation in 1990 and 2012, respectively) and the decision tree in figure 4.2 of the IPCC good practice guidance.

48. In response to a question raised by the ERT during review, the Party stated that the inventory agency is continuing to engage with agricultural researchers in this area and envisages that a tier 2 approach for estimating emissions from sheep may be in place for the

[6] O'Mara, F., 2006. Development of Emission Factors for the Irish Cattle Herd. Environmental Protection Agency, Johnstown Castle, Wexford, Ireland.

[7] Hyde, B., Carton, O.T. and Murphy, W.E. (2008). Farm Facilities Survey – Ireland 2003. Report prepared for the Department of Agriculture by Teagasc, Johnstown Castle, Co. Wexford.

2016 submission if all relevant data for the development of tier 2 estimates can be obtained. The ERT encourages the Party to move up to a tier 2 method when reliable data and information become available.

Manure management – CH_4 and N_2O

49. Ireland used a tier 2 method provided by the IPCC good practice guidance to estimate the CH_4 emissions for this category. For cattle, the EFs have been derived based on country-specific values for volatile solid excretion (VS), maximum methane-producing capacity for manure (B_o) and fraction of manure handled using different animal waste management systems (AWMS); default values for methane conversion factors (MCFs) have been used. For the other livestock types, country-specific values for AWMS and default values for VS, B_o and MCF have been used. The approach implemented is in line with the IPCC good practice guidance.

50. Fixed N excretion rates have been used for all animals except dairy cattle for the whole time series. N_2O emissions from manure management for non-dairy cattle was found to be a significant category, while for dairy cattle this is an important category, accounting for 62.7 per cent and 24.3 per cent of the total N excreted by animals in 2012, respectively. The excretion rates for other animals were not significant. In response to a question raised by the ERT during the review, the Party stated that the inventory agency is continuing to engage with agricultural stakeholders to develop dynamic N excretion rates for non-dairy cattle. The ERT reiterates the recommendation made in the previous review report that the Party develop dynamic N excretion rates for non-dairy cattle and use the related data in the inventory, when the data become available.

Agricultural soils – N_2O

51. Ireland used country-specific values for the fraction of nitrogen that volatilises as NH_3 and NO_X from animal manure ($Frac_{GASM}$) that is associated with the fraction of sewage sludge N that volatilizes as NH_3 and nitrogen oxides (NO_X) during housing, manure storage, landspreading and grazing; and a default value for $Frac_{GASM}$ that is associated with the fraction of sewage sludge N. During the previous review, the Party explained that it was in the process of investigating the applicability of estimating NH_3 emissions from the spreading of sewage sludge on agricultural land. In response to a question raised by the current ERT during the review, Ireland stated that, to date, no country-specific data have been identified to replace the use of the default value and that the default value is only used for sewage sludge, accounting for less than 1 per cent of the amount of N applied to soils. As a next step, the Irish inventory agency will engage with similar reporting Parties to identify appropriate parameters to allow for the estimation of a country-specific value. The ERT encourages the Party to replace the default $Frac_{GASM}$ for sewage sludge N data with country-specific data when they become available.

E. Land use, land-use change and forestry

1. Sector overview

52. In 2012, net removals from the LULUCF sector amounted to 3,144.85 Gg CO_2 eq. Since 1990, net removals have increased by 36.0 per cent. The key drivers for the rise in removals are the increase in removals in forest land remaining forest land, the decrease in emissions in grassland remaining grassland and the increase in removals in land converted to grassland. Within the sector, 3,815.82 Gg CO_2 eq of net removals were from forest land, followed by 52.17 Gg CO_2 eq from grassland. Net emissions were reported from cropland (422.43 Gg CO_2 eq) and from settlements (256.47 Gg CO_2 eq). Wetlands accounted for 34.92 Gg CO_2 eq and other land accounted for 9.32 Gg CO_2 eq.

53. Ireland has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Ireland between the 2013 and 2014 annual submissions were in the following categories: carbon stock changes in mineral soils in forest land converted to settlements and in land converted to other land. The recalculations were made in response to the 2013 annual review report. Compared with the 2013 annual submission, the recalculations increased emissions in the LULUCF sector by 63.02 Gg CO_2 eq in 2011 (1.70 per cent). The recalculations were adequately explained in the 2014 NIR.

54. The structure of Ireland's NIR for the LULUCF sector is different from the annotated outline of an NIR used by most other reporting Parties.[8] Specifically, category descriptions (e.g. characteristics and trends of sources and sinks), which could be described as the first section of each category, are not included in the structure of Ireland's NIR for the LULUCF sector. In response to a question raised by the ERT during the review, the Party acknowledged that the LULUCF chapter does not fully adhere to the format in the annotated outline of an NIR, and stated that it is currently engaged in a process to revise the structure of the NIR to conform to the format mandated for the second commitment period of the Kyoto Protocol, provided in the annex to decision 24/CP.19. The ERT commends the Party for its effort to improve the description, and recommends that the Party follow the structure of the NIR shown in the annex to decision 24/CP.19. In addition, the ERT encourages the Party to include descriptions for each category, such as the characteristics of each category as shown section 6.4.1 in the structure of the NIR recommended in the annex to decision 24/CP.19, in order to ensure that readers can easily understand the characteristics of each category.

55. The previous review report[9] recommended that the Party include information on the key drivers of emission/removal trends for each category, such as forest land, cropland, grassland, wetlands, settlements and other land, which should be included in sections of the NIR. However, information on the trend for each category has not been included in the NIR. The ERT considers that the information on the key drivers of emission/removal trends for cropland, grassland, wetlands, settlements and other land included in Ireland's NIR is not sufficiently transparent. The ERT reiterates the recommendation that the Party include the information on the key drivers of emission/removal trends for cropland, grassland, wetlands, settlements and other land in the NIR of the next annual submission.

2. Key categories

Forest land – CO_2

56. The NIR states that the country-specific EF for organic forest soils is 0.58 Mg C/ha on page 157, but this value is given as 0.59 Mg C/ha on page 158 of the NIR. In response to a question raised by the ERT on this issue, the Party stated that 0.59 Mg C/ha is the correct country-specific EF used, and the value of 0.58 Mg C/ha on page 157 of the NIR is a typographical error. The ERT recommends that the Party correct this typographical error in the next annual submission.

57. The Party reported the carbon stock changes in mineral soils in forest land remaining forest land, land converted to forest land and forest land converted to grassland and other land as "NO", justifying its use of this notation key by stating and verifying in chapter 11 of the NIR that the pool is not a source according to the requirements of the annex to decision

[8] Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

[9] FCCC/ARR/2013/IRL, paragraph 67.

16/CMP.1, although this provision is only applicable to activities under the Kyoto Protocol. However, the ERT considers that "not a source" is not equal to saying that the activity does "not occur". Hence, if there is the possibility that this pool is a sink, the ERT recommends that the Party report the removals for the pool or report the pool as "NE" instead of "NO". Alternatively, if the carbon stock changes in the pool are assumed to be zero because losses are balanced out by gains, the ERT recommends that the Party report the carbon stock changes as "NA" (not applicable), as mentioned in the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines), which states that the notation key "NA" is used "for activities in a given source/sink category that do not result in emissions and removals of a specific gas".

58. The Party reported in its NIR (section 7.3.4.4, page 169) that emissions from soils due to biomass burning resulting from forest wildfires are "assumed to be negligible and do not occur (NO)". However, the ERT considers that "negligible" is not equal to "NO" because "negligible" means that there is a very small quantity of emissions. In response to a question raised by the ERT during the review, the Party explained that the emissions from soils cannot occur. If the description "assumed to negligible" was an unnecessary description and made readers confused because the description caused misunderstanding that there were emissions from soils during biomass burning even though they were very small. Therefore, the ERT recommends that the Party delete the sentence from its NIR in order to avoid confusion.

Forest land – N_2O

59. The Party used a country-specific EF to estimate the carbon stock changes in organic forest soils, as reported on page 158 of the NIR, but used the IPCC tier 1 default EF for N_2O emissions from drainage from forest land remaining forest land, as reported in section 7.3.4.6 of the NIR. The ERT considers that, in order to enhance the accuracy of the estimates, it is good practice to use the same tier to estimate the carbon stock changes in and the N_2O emissions from soils in the same category since N_2O emissions and CO_2 emissions are linked by the C/N ratio. Hence, the ERT encourages the Party to use the same tier to estimate the carbon stock changes in and the N_2O emissions from soils in the same category.

Wetlands remaining wetlands – CO_2

60. The Party reported the carbon stock changes in dead organic matter (DOM) in managed wetlands in this category as "IE". However, it is not explained in either the NIR or the CRF tables which category includes the reporting for these carbon stock changes. In response to a question raised by the ERT during the review, the Party explained that the carbon losses in DOM removed from managed wetlands were reported as emissions in the energy sector. The ERT recommends that the Party include this information in its NIR and the documentation box in CRF table 5.D in order to enhance transparency.

Land converted to wetlands – CO_2

61. The Party reported the carbon stock changes in soils in forest land converted to wetlands as "NO". In response to a question raised by the ERT during the review, the Party explained that there are no mineral soils in wetlands, and emissions from organic soils do not occur because drains on deforested lands are blocked and emissions of CO_2 have ceased. In the 2014 annual submission, the NIR included the information on organic soils in wetlands, but it did not include information that mineral soils do not exist in wetlands. The ERT recommends that the Party include the information on mineral soils in wetlands in the next annual submission in order to clarify what kinds of soils are included in wetland areas.

3. Non-key categories

Settlements remaining settlements – CO_2

62. The Party reported the carbon stock changes in soils in settlements remaining settlements as "NO", but the reasons for this reporting are not described in the NIR. In response to a question raised by the ERT during the review, the Party explained that the carbon gains in the mineral soils are assumed to be equal to the carbon losses by applying the tier 1 approach in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF), and mentioned that it has included this explanation in its NIR. Meanwhile, if the carbon stock changes in the pool are assumed to be zero because the losses are balanced out by the gains, the ERT considers that the carbon stock changes should be reported as "NA" because the UNFCCC reporting guidelines state that "NA" is used "for activities in a given source/sink category that do not result in emissions and removals of a specific gas". Therefore, the ERT recommends that the Party report the carbon stock changes in this category as "NA" instead of "NO" and include an explanation for the use of the notation key in its NIR.

F. Waste

1. Sector overview

63. In 2012, emissions from the waste sector amounted to 1,007.26 Gg CO_2 eq, or 1.7 per cent of total GHG emissions. Since 1990, emissions have decreased by 27.2 per cent. The key driver for the fall in emissions is the increase in CH_4 recovery from solid waste disposal sites, which has increased from 9.1 per cent of emissions generated in 1996 to 67.9 per cent in 2012. Within the sector, 79.8 per cent of the emissions were from solid waste disposal on land, followed by 16.3 per cent from wastewater handling and 3.9 per cent from waste incineration.

64. The Party has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Ireland between the 2013 and 2014 annual submissions were in the following categories: CH_4 emissions from solid waste disposal on land, and from domestic and commercial wastewater and CO_2 emissions from waste incineration for the entire time series. The recalculations were made due to the revision of the waste and population statistics. Compared with the 2013 annual submission, the recalculations increased emissions in the waste sector by 25.41 Gg CO_2 eq (2.4 per cent), and increased total national emissions by 0.04 per cent.

65. The ERT noted several inconsistencies between NIR table 8.6 and table I.2 in annex I to the NIR. In response to a question raised by the ERT during the review, the Party explained that the data in the tables have misaligned columns. The ERT encourages the Party to correct the error to improve the accuracy of the NIR.

66. The QC procedures are well documented in the NIR. However, the sector-specific QA activities have not been documented. The ERT encourages Ireland to fully document the QA activities in the NIR.

67. Ireland has provided uncertainty estimates for emissions from solid waste disposal on land but not for wastewater handling or incineration in the waste section of the NIR. The ERT recommends that Ireland expand the discussion of uncertainty in the waste chapter to include the uncertainty estimates for wastewater handling and incineration in its next annual submission.

2. Key categories

Solid waste disposal on land – CH_4

68. Ireland uses the tier 2 method from the IPCC good practice guidance, first-order decay (FOD) model, to estimate emissions from managed waste disposal on land, which is consistent with the 2006 IPCC Guidelines. In response to recommendations made in previous review reports, Ireland separated organic waste into food and garden waste from 2004 onwards. The ERT commends the Party for this improvement and further recommends that the Party disaggregate the AD for the years up to 2003 in order to ensure time-series consistency.

69. Ireland provides information on waste composition in annex I to the NIR. The ERT noted that the reported amount of generated municipal solid waste (MSW) is lower than the reported amount of managed MSW for the years 1990–1998 and 2009. In response to a question raised by the ERT during the review, the Party explained that the error occurred as a consequence of the non-inclusion of town dumps and the landfill site W047 in the national waste reports, as sufficient information in relation to the sites was not available at the time of publication of national waste report. The ERT recommends that Ireland update the information on MSW generation in the NIR and the CRF tables of its next annual submission.

70. The ERT noted that the values for the time lag between disposal and methanogenesis, oxidation and the fraction of CH_4 in landfill gas used in the FOD model are not explicitly discussed in the NIR. The ERT reiterates the recommendation made in the previous review report that Ireland include a discussion of these model parameters in its next NIR, including the values used and justification for their use.

3. Non-key categories

Wastewater handling – CH_4 and N_2O

71. Ireland reports that all wastewater treatment plants employ aerobic processes, but that a small proportion of sludge is treated anaerobically. In response to a recommendation made in the 2013 review report, Ireland estimated CH_4 emissions from sludge from plants with anaerobic treatment separately for all years from 2003 to 2012. The remaining CH_4 emissions from sludge are from the population equivalent not served by urban wastewater treatment plants. The ERT recommends that Ireland provide a discussion of the methodology used in the NIR in order to increase the transparency of its reporting.

72. The ERT noted that there is limited information on industrial wastewater in the NIR. The ERT recommends that the Party describe the source and derivation of the AD and the industrial sectors contributing to the biochemical oxygen demand (BOD) load.

Waste incineration – CO_2, CH_4 and N_2O

73. Ireland estimates emissions from solvent and clinical waste incineration using the tier 1 method from the 2006 IPCC Guidelines. The ERT encourages Ireland to include a discussion in its NIR on the applicability of the EFs from the 2006 IPCC Guidelines to its incinerator units.

74. The ERT noted that there is double counting of AD in the quantity of clinical waste incinerated reported for both biogenic and non-biogenic waste in CRF table 6.C for the years 1990–1997. The ERT reiterates the recommendation made in the previous review report that Ireland correct this double counting in the CRF tables by disaggregating the AD into biogenic and non-biogenic components.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

75. Table 6 provides an overview of the information reported and parameters selected by Ireland under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Assessment of the Party's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1	Sufficient	
Activities elected under Article 3, paragraph 4, of the Kyoto Protocol	None	
Period of accounting		Commitment period accounting
Party's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	

76. Chapter G.1 includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities and the change from the first commitment period to the second commitment period, paragraphs 77–81 below contain the ERT's assessment of the Party's adherence to the current reporting guidelines and do not provide specific recommendations for reporting of these activities in the 2015 annual submission.

77. In the previous review report,[10] the ERT recommended that the Party include a paragraph explaining the assessment of the key category analysis for the KP-LULUCF activities in chapter 11 of its NIR. In response to a question raised by the ERT during the review, the Party explained that the trend and level key category analysis have been performed for LULUCF, and the information was included not in chapter 11 of the NIR but in annex B to the NIR (pages 300–318). However, the ERT notes that the information in these pages includes key categories for all sectors and it is difficult to immediately find information on KP-LULUCF activities. Hence, the ERT reiterates the recommendation made in the previous review report that the Party include a paragraph explaining the assessment of key categories for the KP-LULUCF activities in chapter 11 of its NIR in order to enhance the transparency of its NIR.

[10] FCCC/ARR/2013/IRL, paragraph 99.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2, CH_4 and N_2O

78. The Party has reported information on activities under Article 3, paragraph 3, of the Kyoto Protocol in chapters 7 and 11 of the NIR and annex H thereto, as well as in the appropriate CRF tables. The information has been prepared and reported in accordance with decision 15/CMP.1, although the ERT notes that some of the information should be added in the NIR and the KP-LULUCF CRF tables in the next annual submission, as mentioned in the paragraphs 79–81 below.

79. CRF table 5(KP-I)A.1.1 shows implied carbon stock change factors for organic soils in afforestation and reforestation, which vary from year to year and are lower than the carbon stock change factor which the Party mentioned on page 158 of the NIR (0.59 t C/ha/year), as well as lower than the IPCC default value (0.68 Mg C/ha). In response to a question raised by the ERT during the review, the Party explained that the emissions from organic soils included those from peat soils (i.e. organic soils to a depth of 30 cm) and organo-mineral soils which have an organic layer less than 30 cm, so the implied carbon stock change factors for both organic and organo-mineral soils would be less than the country-specific carbon stock change factor mentioned on page 158 of the NIR. The Party also explained that both organo-mineral and organic soils are reported under organic soils in a lump in CRF table 5(KP-I)A.1. In order to enhance transparency, the ERT recommends that the Party include this information in its NIR.

Deforestation – CO_2, CH_4 and N_2O

80. CRF table 5(KP-I)A.2 shows implied the carbon stock change factors for organic soils under deforestation which vary and, except for the implied carbon stock change factor for the 2012 value, are lower than the carbon stock change factor which Ireland mentioned on page 158 of the NIR (0.59 t C/ha/year), as well as lower than the IPCC default value (0.68 Mg C/ha). In response to a question raised by the ERT during the review, the Party explained that the emissions from organic soils included those from peat soils (i.e. organic soils to a depth of 30 cm) and organo-mineral soils which have an organic layer less than 30 cm, so the implied carbon stock change factors for both organic and organo-mineral soils would be less than the country-specific EF mentioned on page 158 of the NIR. The Party also explained that both organo-mineral and organic soils are reported under organic soils in KP-LULUCF CRF table 5(KP-I)A.2 in a lump. In order to enhance transparency, the ERT recommends that the Party include this information in its NIR.

81. The ERT noted that, in CRF table 5(KP-I)A.2 for 2008, the implied carbon stock change factor for losses in above-ground biomass in forest land converted to grassland under deforestation (i.e. –2.408 Mg C/ha), is smaller than that for below-ground biomass in the same category (i.e. –3.490 Mg C/ha), although the implied carbon stock change factor for losses in above-ground biomass should be larger than that in below-ground biomass according to the national circumstances of the Party. In response to a question raised by the ERT during the review, the Party explained that the sampling plot for measuring carbon stocks in above- and below-ground biomass contained regenerating young broadleaf forest/scrub, and that the stump and root biomass is greater than the stems and branch biomass in the regenerating young broadleaf forest/scrub. The ERT recommends that the Party include this information in its NIR in order to enhance transparency.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

82. Ireland has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[11] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

83. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol

84. The Party has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

85. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 7
Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO_2 eq

	2014 annual submission[a]		
	As reported	*Revised estimates*	*Final accounting quantity*[b]
Afforestation and reforestation			
Non-harvested land	–17 690 554		–17 690 554
Harvested land	–210 745		–210 745
Deforestation	1 610 147		1 610 147
Forest management	NA		NA
Article 3.3 offset[c]	NA		NA
Forest management cap[d]	NA		NA
Cropland management	NA		NA
Grazing land management	NA		NA
Revegetation	NA		NA

[11] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

Abbreviations: CRF = common reporting format, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

[b] The "final accounting quantity" is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission.

[c] "Article 3.3 offset": for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[d] In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

86. Based on the information provided in table 7 for the activity afforestation and reforestation, Ireland shall: for non-harvested land, issue 17,690,554 removal units (RMUs) in its national registry; and for harvested land, issue 210,745 RMUs in its national registry.

87. Based on the information provided in table 7 for the activity deforestation, Ireland shall cancel 1,610,147 assigned amount units, emission reduction units, certified emission reduction units and/or RMUs in its national registry.

Calculation of the commitment period reserve

88. Ireland has reported its commitment period reserve in its 2014 annual submission. Ireland reported that its commitment period reserve has not changed since the initial report review (282,765,845 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

89. Ireland reported that there are no changes in its national system since the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

90. Ireland reported that there are changes in its national registry since the previous annual submission. The Party described the changes to the database structure that only affects EU ETS functionality in its NIR. The ERT concluded that, taking into account the confirmed changes in the national registry, Ireland's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

91. Following a recommendation made in the previous review report, Ireland submitted the second addendum to chapter 14 ("Information on changes in national registry of the annual inventory submission for the reporting year 2012"). The Consolidated System of European Union Registries (CSEUR) successfully completed a full certification procedure in June 2012. Notably, this procedure includes connectivity testing, connectivity reliability

testing, distinctness testing and interoperability testing to demonstrate capacity and conformance to the Data Exchange Standard. This included a full test of annex H to the NIR. All tests were executed successfully and led to successful certification on 1 June 2012. The October 2012 release (version 4.0) was only a minor iteration and changes were limited to EU ETS functionality and had no impact on Kyoto Protocol functions in the registry.

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

92. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Ireland provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. Actions reported by the Party include, for example, the use or removal of subsidies associated with environmental technologies with the final aim of reducing GHG emissions, and projects to support developing countries in the development of technological solutions for reducing GHG emissions and strengthening the capacity for tackling environmental efficiency issues. As an EU member State, Ireland's actions in this area are largely dictated by the European Commission's policy on climate change and by its policies and programmes affecting developing countries.

93. Ireland reported that there are no changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, since the previous annual submission. The ERT concluded that the information provided continues to be complete and transparent.

III. Conclusions and recommendations

A. Conclusions

94. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of Ireland, in accordance with the Article 8 review guidelines.

Table 8
Expert review team's conclusions on the 2014 annual submission of Ireland

Issue	*Expert review team assessment*	*Paragraph cross references for identified problems*
The ERT concludes that the inventory submission of Ireland is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources[a]	Complete	
LULUCF[a]	Complete	
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of Ireland has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	

Issue	*Expert review team assessment*	*Paragraph cross references for identified problems*
The Party's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Yes	
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
The Party has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	82, 83
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	89
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	90, 91
Did the Party provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	92, 93

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

B. Recommendations

95. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified.

Table 9
Recommendations identified by the expert review team

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
Cross-cutting	General	Include the information on the key drivers of emission/removal trends for cropland, grassland,	No	4

Sector	Category/cross-cutting issue	Recommendation	Reiteration of previous recommendation?	Paragraph cross references
		wetlands, settlements and other land in the next NIR		
		Include a paragraph explaining the assessment of key categories for the KP-LULUCF activities in chapter 11 of the NIR	Yes	Table 4
		Include a paragraph explaining the assessment of key categories for the KP-LULUCF activities in chapter 11 of the NIR in order to enhance the transparency of the NIR	Yes	77
Energy	Reference approach	Further investigate the difference between the reference approach and the sectoral approach, and report accordingly in the next NIR	No	22
	Feedstocks and non-energy use of fuels	Investigate the emissions related to the non-energy use of lubricants, other than road transportation, and report accordingly in the next annual submission	No	25
	Stationary combustion: liquid and gaseous fuels – CO_2	Improve the transparency of the reporting of emission estimates for this category by providing more information in relation to the use of EU ETS data in the NIR	Yes	26
		Provide information on the AD and CO_2 EFs for the different types of fuel and industrial activities reported under other (manufacturing industries and construction)	No	27
		Investigate further the issue of the high IEF for gaseous fuels in petroleum refining and report accordingly in the next NIR	No	28
	Other transportation: liquid fuels – CO_2	Review the notation key used to report liquid fuels and, as appropriate, change the notation key from "NO" to "IE", and provide a transparent description of the basis for dividing fuel consumption between road and non-road traffic	Yes	30
	Oil and natural gas: gaseous fuels – CO_2 and CH_4	Provide an explanation of where fugitive emissions of CH_4 and CO_2 from natural gas exploration and transmission are reported both in the CRF tables and in the NIR, and provide a detailed description of how the emissions from each activity are estimated in the NIR	No	31
		Explain where fugitive CO_2 emissions from natural gas and fugitive CH_4 emissions from venting and flaring are allocated in the CRF tables	No	32
		Use the notation keys consistently between the NIR and the CRF tables	No	32

Sector	*Category cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		Use the appropriate notation keys and provide a detailed description of how the emissions from each activity are estimated in the NIR	No	33
		Include the information on the mobile drilling unit in the Kinsale field in 2001 in the next NIR	No	34
Industrial processes and solvent and other product use	Consumption of halocarbons and SF_6 – HFCs and SF_6	Provide additional information on how the potential sources (e.g. from imported products) are considered in the emission estimates from this category to ensure a complete and accurate inventory	No	40
	Limestone and dolomite use – CO_2	Ensure consistency within the NIR and between the NIR and CRF tables in future submissions	Yes	41
Agriculture	Manure management – CH_4 and N_2O	Develop dynamic N excretion rates for non-dairy cattle and use the related data in the inventory, when the data become available	Yes	50
	Agricultural soils – N_2O	Replace the default $Frac_{GASM}$ data with country-specific data when they become available	Yes	51
LULUCF	General	Follow the structure of the NIR shown in the annex to decision 24/CP.19	No	54
		Include the information on the key drivers of emission/removal trends for cropland, grassland, wetlands, settlements and other land in the NIR	Yes	55
	Forest land – CO_2	Correct the typographical error regarding the value of the country-specific EF for organic forest soils	No	56
		Report the removals for the pool or report the pool as "NE" instead of "NO", or report the carbon stock changes as "NA" if the carbon stock changes in the pool are assumed to be zero because the losses are balanced out by the gains	No	57
		Delete the sentence "emissions from soils due to biomass burning resulting from forest wildfires are "assumed to be negligible and do not occur (NO)" from the NIR in order to avoid confusion	No	58
	Wetlands remaining wetlands – CO_2	Include the information on the carbon losses in DOM removed from managed wetlands in the NIR and in the documentation box in CRF table 5.D in order to enhance transparency	No	60
	Land converted to wetlands – CO_2	Include the information on mineral soils in wetlands in the next annual submission in order to clarify what kinds of soils are included in wetland areas	No	61

Sector	Category/cross-cutting issue	Recommendation	Reiteration of previous recommendation?	Paragraph cross references
	Settlements remaining settlements – CO_2	Report the carbon stock changes in this category as "NA" instead of as "NO" and include an explanation for the use of the notation key in the NIR	No	62
Waste	General	Expand the discussion of uncertainty in the waste chapter to include the uncertainty estimates for wastewater handling and incineration	No	67
	Solid waste disposal on land – CH_4	Disaggregate the AD for the years up to 2003 in order to ensure time-series consistency	No	68
		Update the information on MSW generation in the NIR and the CRF tables	No	69
		Include a discussion of these model parameters in the next NIR, including the values used and justification for their use	Yes	70
	Wastewater handling – CH_4 and N_2O	Provide a discussion of the methodology used in the NIR in order to increase the transparency of the reporting	No	71
		Describe the source and derivation of the AD and the industrial sectors contributing to the BOD load	No	72
	Waste incineration – CO_2, CH_4 and N_2O	Correct the double counting of AD in the quantity of clinical waste incinerated in the CRF tables by disaggregating the AD into biogenic and non-biogenic components	Yes	74
KP-LULUCF	Afforestation and reforestation – CO_2, CH_4 and N_2O	Include the information on the implied carbon stock change factors for organic soils in afforestation and reforestation in the NIR	No	79
	Deforestation – CO_2, CH_4 and N_2O	Include the information on the implied carbon stock change factors for organic soils under deforestation in the NIR	No	80
		Include information explaining that the sampling plot for measuring carbon stocks in above- and below-ground biomass contains regenerating young broadleaf forest/scrub, and that the stump and root biomass is greater than the stems and branch biomass in the regenerating young broadleaf forest/scrub in the NIR in order to enhance transparency	No	81

Abbreviations: AD = activity data, BOD = biochemical oxygen demand, CRF = common reporting format, DOM = dead organic matter, EF = emission factor, EU ETS = European Union Emissions Trading System, $Frac_{GASM}$ = fraction of sewage sludge N that volatilizes as NH_3 and NO_X, IE = included elsewhere, IEF = implied emission factor, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, MSW = municipal solid waste, NA = not applicable, NE= not estimated, NIR = national inventory report, NO = not occurring.

IV. Questions of implementation

96. No questions of implementation were identified by the ERT during the review.

Annex I

Information to be included in the compilation and accounting database

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2012, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	282 765 845			282 765 845
Annex A emissions for 2012				
CO_2	38 011 386			38 011 386
CH_4	12 074 009			12 074 009
N_2O	7 416 593			7 416 593
HFCs	982 008			982 008
PFCs	8 030			8 030
SF_6	39 211			39 211
Total Annex A sources[c]	**58 531 238**			**58 531 238**
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	–3 693 064			–3 693 064
3.3 Afforestation and reforestation on harvested land for 2012	–153 732			–153 732
3.3 Deforestation for 2012	224 447			224 447
Activities under Article 3, paragraph 4, for 2012[d]				
3.4 Forest management for 2012				
3.4 Cropland management for 2012				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2012				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2012				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.
[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2011

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2011				
CO_2	37 716 338			37 716 338
CH_4	11 692 047			11 692 047
N_2O	7 288 433			7 288 433
HFCs	992 277			992 277
PFCs	13 198			13 198
SF_6	47 665			47 665
Total Annex A sources[c]	**57 749 958**			**57 749 958**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–3 713 286			–3 713 286
3.3 Afforestation and reforestation on harvested land for 2011	–78 122			–78 122
3.3 Deforestation for 2011	332 702			332 702
Activities under Article 3, paragraph 4, for 2011[d]				
3.4 Forest management for 2011				
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	41 292 132			41 292 132
CH_4	11 720 624			11 720 624
N_2O	7 837 024			7 837 024
HFCs	973 367			973 367
PFCs	37 022			37 022
SF_6	34 735			34 735
Total Annex A sources[c]	**61 894 904**			**61 894 904**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–3 630 307			–3 630 307
3.3 Afforestation and reforestation on harvested land for 2010	–28 916			–28 916
3.3 Deforestation for 2010	210 066			210 066
Activities under Article 3, paragraph 4, for 2010[d]				
3.4 Forest management for 2010				
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	41 749 645			41 749 645
CH_4	11 947 663			11 947 663
N_2O	7 551 086			7 551 086
HFCs	957 125			957 125
PFCs	65 570			65 570
SF_6	41 169			41 169
Total Annex A sources[c]	**62 312 258**			**62 312 258**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–3 473 380			–3 473 380
3.3 Afforestation and reforestation on harvested land for 2009	43 754			43 754
3.3 Deforestation for 2009	381 870			381 870
Activities under Article 3, paragraph 4, for 2009[d]				
3.4 Forest management for 2009				
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 14
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	47 005 718			47 005 718
CH_4	12 237 966			12 237 966
N_2O	7 640 052			7 640 052
HFCs	973 059			973 059
PFCs	106 197			106 197
SF_6	57 496			57 496
Total Annex A sources[c]	**68 020 488**			**68 020 488**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–3 180 517			–3 180 517
3.3 Afforestation and reforestation on harvested land for 2008	6 271			6 271
3.3 Deforestation for 2008	461 062			461 062
Activities under Article 3, paragraph 4, for 2008[d]				
3.4 Forest management for 2008				
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates if any and/or adjustments if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

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B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Paul Duffy and Ms. Eimear Cotter (Irish Environmental Protection Agency), including additional material on the methodology and assumptions used. The following documents were also provided by Ireland:

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Annex III

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management system
B_o	maximum methane-producing capacity for manure
BOD	biochemical oxygen demand
C	carbon
$CaCO_3$	calcium carbonate
CH_4	methane
cm	centimeter
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CP	Conference of the Parties
CRF	common reporting format
CRRP	climate resource and research programme
CSEUR	consolidated system of European Union registries
CSO	central statistics office of Ireland
DCENR	department of communications, energy and natural resources
DECLG	department of the environment, community and local government
DES	data exchange standard
DOM	dead organic matter
EF	emission factor
EPA	Environmental Protection Agency
ERT	expert review team
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
FOD	first-order decay
$Frac_{GASM}$	fraction of sewage sludge N that volatilizes as NH_3 and NO_X
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
ha	hectare
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
Mg	megagram (1 Mg = 1 tonne)
MSW	municipal solid waste
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NCV	net calorific value

NE	not estimated
NH_3	ammonia
NIR	national inventory report
NO	not occurring
NO_X	nitrogen oxides
OCLR	Office of Climate, Licensing, Resource and Research
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
RMU	removal unit
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
t	tonne
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change
VS	volatile solid excretion